AIR WAR COLLEGE

RESEARCH REPORT

SPACE OPERATIONS FORCE MANAGEMENT--CAN WE MEET THE CHALLENGE?

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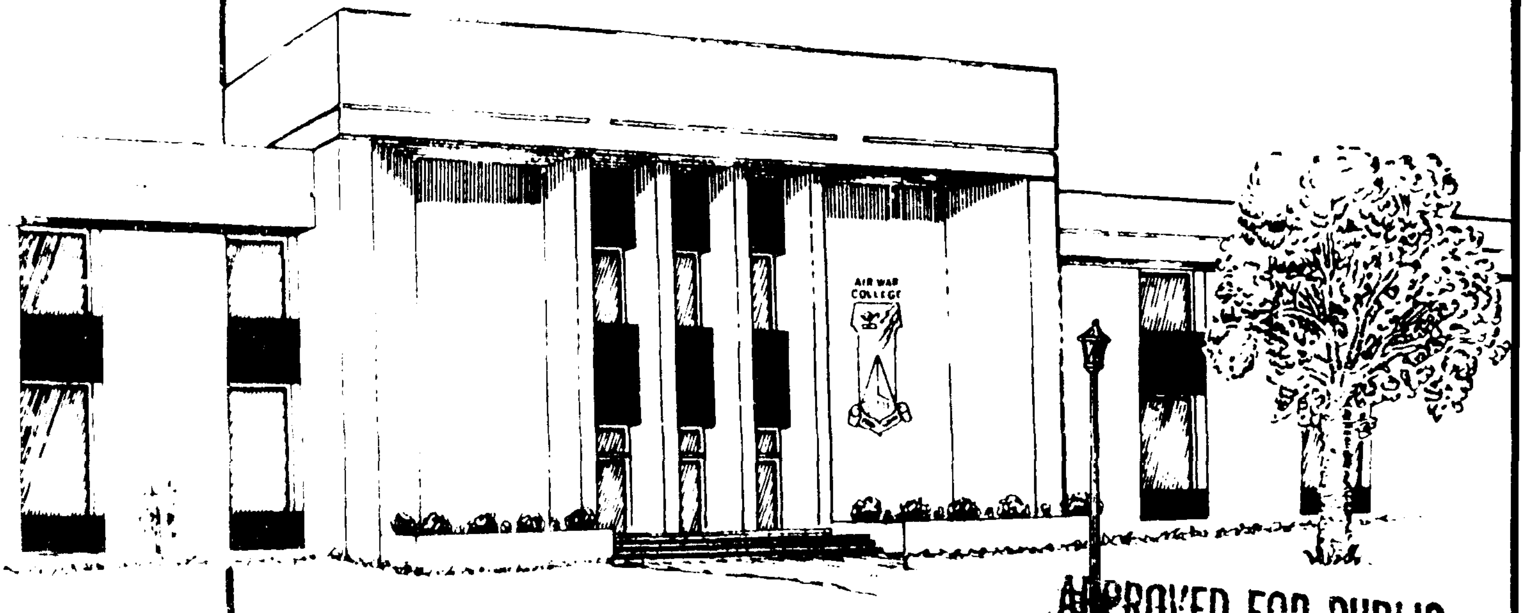
1990



AIR UNIVERSITY
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MAXWELL AIR FORCE BASE, ALABAMA

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SPACE OPERATIONS FORCE MANAGEMENT
CAN WE MEET THE CHALLENGE?

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A DEFENSE ANALYTICAL STUDY SUBMITTED TO THE FACULTY

IN

FULFILLMENT OF THE CURRICULUM

REQUIREMENT

Advisor: Colonel Eric E. Sundberg

MAXWELL AIR FORCE BASE, ALABAMA

May 1990

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EXECUTIVE SUMMARY

TITLE: Space Operations Force Management--
Can We Meet the Challenge?

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The space operations mission and career field have grown dramatically as the contribution of space systems to our national security steadily increases. The space operations specialty (AFSC-20XX) is currently supported via college graduates (accessions) with a technical or science degree and crossflows from other career areas with a technical background. However, as the analyses in this study indicate, we may not be able to meet outyear space operations manpower requirements. Space operations manpower shortfalls could be very analogous to the pilot shortfalls of today.

Specific findings reveal a decreased overall target accession population, decreased production of technical graduates, reduced manning levels, and decreased retention. This is exacerbated by increased competition from civilian industry. Proposed recommendations include: 1) elimination of technical degree requirements, 2) revision of Undergraduate Space Training to emphasize operator tasks vice technical knowledge, 3) Stabilization of 20XX accession quotas, 4) maintenance of flexibility mechanisms to meet unexpected growth, and 5) expansion of reserve component space operations positions. The paper concludes by emphasizing the need for early recognition of this problem and immediate implementation of innovative solutions.

BIOGRAPHICAL SKETCH

Lieutenant Colonel Bruce M. Roang has worked in USAF space operations during most of his career. After an initial assignment in Minuteman III operations at Minot AFB, ND, he served as Space Defense Center Senior Director and Chief, Space Defense Standardization/Evaluation Division while assigned to NORAD's Cheyenne Mountain Complex, CO. Colonel Roang then served as Space Systems Director, Clear AFS, AK; Chief, Space Weapons Branch within DCS/Operations, HQ AFSPACECOM; and Chief, Space Operations Assignments, HQ AFMPC. Immediately prior to his assignment to Air War College, he was Director of Operations, 1013th Combat Crew Training Squadron, Peterson AFB, CO. His awards include the Defense Meritorious Service Medal (1 OLC), the Meritorious Service Medal (2 OLC), and the AF Commendation Medal. He received his B.A. at San Diego State University and M.A. from the University of Oklahoma. Colonel Roang is a graduate of the Air War College, class of 1990.

TABLE OF CONTENTS

CHAPTER		PAGE
	DISCLAIMER	ii
	EXECUTIVE SUMMARY	iii
	BIOGRAPHICAL SKETCH	iv
I	INTRODUCTION	1
	The Problem	1
	Methodology	3
II	SPACE OPERATIONS MANPOWER INFRASTRUCTURE	4
	The Basics	4
	History	7
	Demographics	8
	Accessions	10
	Training	11
	Current Infrastructure	12
III	CURRENT AND PROJECTED REQUIREMENTS	14
IV	FACTORS AFFECTING SPACE OPERATIONS MANPOWER	18
	Retention	20
	Predictive Analysis	24
V	FINDINGS--IS THERE A PROBLEM?	28
VI	RECOMMENDATIONS AND CONCLUSIONS	32
	LIST OF REFERENCES	37
	APPENDICES	39
	A. Blue Ribbon Panel Strategies	39
	B. 20XX History/Growth	40
	C. Space Operations Manning (Apr 90)	41
	D. 20XX By Year Group	42

Chapter One

INTRODUCTION

THE PROBLEM

The Air Force is and will be responsible for the global employment of military power above the earth's surface. The contribution of space systems and space operations is not likely to remain simply as an additive or enhancer to atmospheric (air breathing) systems, but will ultimately compete with them to accomplish strategic and tactical mission requirements. To effectively meet this challenge, the Air force must comprehensively plan for a future in which space power assumes a decisive role in combat operations. (1:3) Thus, the process of developing and totally integrating space operations into the Air Force and our national security decision making options has ramifications in many areas. (1:3) Doctrine, roles, missions, technology, and force structure will all have to be analyzed and assessed--so will the personnel infrastructure and resources required to support an emerging space power capability.

To support this process, the CORONA TOP conference that convened on 8 April 1988 devoted its entire agenda to a single topic, the status and future of the Air Force space program. At the conclusion of the conference, the Air Force Chief of Staff directed that a Blue Ribbon Panel be established under the supervision of a steering group headed by the Vice Chief of Staff to study the role of the Air Force in space. The other members of the Steering Group were the vice-commanders of AFSC, SAC, MAC,

and TAC, the commander of AFSPACECOM, and senior officers from HQ USAF, AF/XO, and SAF/AQ. The study team itself was composed of senior officers (colonel-level) from the Air Staff, AFSC, AFLC, AFSPACECOM, SAC, TAC, and MAC and was headed by the Air War College Commandant, Maj. Gen. Harold W. Todd. (1:2)

The Blue Ribbon Panel on Space produced a set of recommendations from which a detailed implementation plan was developed with a goal of "maximizing US combat power by defining and implementing a coherent Air Force role in space." (1:2) Though many operational and administrative strategies were suggested to achieve this goal (see Appendix A), two of the most overarching strategies concerned: a) Expanding the flow of personnel within the space community and b) expanding the flow of space expertise throughout the Air Force. However, based on the analysis provided in this paper, it is probable that both these strategies are at risk.

The space operations mission and career area (Air Force Specialty Code-20XX) has grown dramatically over the last eight years and the potential for future growth seems evident. The space operations specialty is currently supported via college graduates (accessions) with a technical or engineering degree and "crossflows" from other career areas with a technical background. However, considering the decreasingly available accession population (due to demographics changes), decreases in scientific and engineering college graduates, decreases in retention of Air Force space operations officers, and predicted low manning

levels, we will not be able to meet outyear space operations manpower requirements. Space operations manpower shortfalls of the future could be very analogous to the pilot shortfalls of today!

METHODOLOGY

As the title suggests, the purpose of this study is to analyze and assess difficulties in meeting the challenges of space operations force management. Having provided some background on Air Force space policy and personnel goals, the following chapters will address the basics of space operations personnel infrastructure, projected growth, demographic and retention problems, and predictions for the future. The study concludes with both technical and managerial findings and recommendations.

Chapter Two

SPACE OPERATIONS MANPOWER INFRASTRUCTURE

THE BASICS

As detailed in Air Force Space Policy, the Air Force envisions a role in space that encompasses the following missions: (2:2)

a. SPACE CONTROL. The Air Force will acquire and operate antisatellite (ASAT) capabilities. The Air Force will provide battle management/C3 for US space control operations, and will perform the integration of ASAT and surveillance capabilities developed for space control operations. When technology permits cost-effective deployment, the Air Force will acquire and operate space-based antisatellite capabilities.

b. FORCE APPLICATION. Should a Ballistic Missile Defense (BMD) deployment decision be made, the Air Force will acquire and operate space-based ballistic missile defense assets, will provide battle management/C3 for BMD and will integrate BMD forces. The Air Force will acquire and operate space-based weapons when they become a feasible and necessary element of our force structure.

c. FORCE ENHANCEMENT. The Air Force will continue to acquire and operate space-based systems for navigation, meteorology, tactical warning and attack assessment, NUDET detection and multi-user communications. The Air Force will continue to support the multi-service approach to conducting space surveillance and for providing mission-unique, space-based communications. The Air Force will acquire and operate a space-based wide area surveillance, tracking and targeting capability and will provide space-based means for space surveillance.

d. SPACE SUPPORT. The Air Force will continue this long-standing role as the provider of launch and common-user, on-orbit support for the Department of Defense.

The Space Operations Utilization Field (20XX) is and will be the primary personnel management resource to accomplish these missions. The Space Operations Utilization Field encompasses the following mission areas: Space Surveillance, Missile Warning,

Satellite Operations, Manned Spaceflight Operations, Command and Control Operations, and Weapons Systems Operations. These areas encompass such functions as command, program formulation, policy, planning, inspection, and direction of space system activities. (3:3) Currently, the minimum education prerequisites for 20XX officers are two college-level mathematics courses (including one semester of calculus) and completion of Undergraduate Space Training. Specific space operations specialties include the following:

Space Operations Staff Officers (AFSC 2016) command or manage space and ballistic missile surveillance and warning systems, satellite command and control activities, space launch systems, manned spaceflight activities, and associated analytical activities. These officers also manage fiscal planning and programming for acquisition, modification, and operation of these systems. The grade spread for these officers is major and lieutenant colonel, though highly qualified captains sometimes fill 2016 positions.

Space Operations Analysts (AFSC 2025) manage space system analytical activities using computer systems, mathematical tools, and celestial mechanics to generate high accuracy satellite position predictions for space surveillance, tracking, and satellite command and control. These officers also plan and simulate satellite maneuvers and use satellite telemetry data to determine satellite vehicle attitude and maneuver capability. In addition, they prepare state-of-the-art studies required by

military and scientific communities and calculate orbit decay predictions. The grade spread for 2025 is second lieutenant through major. However, Space Operations Analyst is generally a first duty assignment for a second lieutenant.

Space Operations Officers (AFSC 2035) command or manage electronic and optical space sensors, missile warning sensors, satellite and weapons operations, and operations center activities. They also operate radar, optical, computer, communications, weapons, and other tactical equipment and direct satellite and space sensor operations and control. This AFSC also has four specialty shredouts; Suffix A, Surveillance and Communications Systems; Suffix B, Space Systems Control; Suffix C, Space and Missile Warning Command and Control Systems; and Suffix D, Space Weapons Systems. The grade spread for 2035 is second lieutenant through lieutenant colonel.

Manned Spaceflight Operations Officers (AFSC 2045) plan, manage, and direct mission planning, preparation, and real-time operations of manned spaceflight programs and activities. In addition to Undergraduate Space Training, these officers must also complete a Manned Spaceflight Operations USAF National Aeronautics and Space Administration training course. The grade spread for 2045 is second lieutenant through lieutenant colonel.

Satellite Operations Officers (AFSC 2055) command satellite operations and control units, operate satellites, and plan,

manage and direct mission planning, training, standardization, and evaluation for satellite systems and activities. The grade spread for 2055 is second lieutenant through lieutenant colonel. Astronauts (AFSC 2066) serve as Mission Specialists and Pilot/Commanders for the space shuttle. Though part of the 20XX specialty, the astronauts are generally scientists and rated officers who are selected via an extremely competitive evaluation process. As such, astronaut force management will not be considered in this study.

Space Operations Directors (AFSC 2096) command or direct space launch systems, manned spaceflight activities, space and missile surveillance systems, weapons activities, satellite command and control activities, and selected senior staff positions. Officers within this specialty are generally unit commanders or directors within a wing, MAJCOM, or HQ USAF. The grade spread for 2096 is lieutenant colonel and colonel. (3)

HISTORY

The proposal to establish a separate Air Force space operations specialty originated in 1964. Previously, the Weapons Controller AFSC 1744 had an "S" suffix (1755S) which identified the few officers who were assigned to space detection and tracking facilities (SPADATS). The career field was formally established 31 March 1966 and consisted of the 2016, 2025, and [illegible] AFSCs. The initial evolution of the 20XX AFSC was slow--as was the Air Force's involvement with the space operations mission. By 1977, only 377 20XX officers were on active duty,

equally split between SPADATS support (non-technical) and research and development (technical) activities. From 1979 to 1982 a solid foundation was established for the huge space operations growth to be evidenced later. Specifically, Strategic Air Command (SAC) assumed responsibility (from Air Defense Command) for the missile early warning mission and supporting sensors in 1979 and initiated several productive efforts concerning 20XX management. Though still a small career field (FY81-534), SAC planned for future growth and orchestrated the crossflow of hundreds of missile operations officers into space operations.

In 1981, the Space Operations Career Management Group was established by HQ USAF and additional AFSCs created to accommodate the growth of manned spaceflight (2045) and satellite operations (2055). Air Force Space Command was established 1 September 1982 and United States Space Command activated 23 September 1985. With the rapid development of these new commands, the space operations specialty became the fastest growing in the Air Force, tripling in size to over 1,600 officers by 1986. (4:1,2)

DEMOGRAPHICS

Currently, the majority of 20XX authorizations are in company grades to satisfy the large requirement for operators of space sensors, command and control centers, and satellite operations units. The majority of these positions are filled by young lieutenants on their first duty assignment. 20XX grade

distribution is similar to other operational AFSCs and is considered "self-sustaining," i.e. there are enough field grade authorizations to accommodate promoted captains. (5:6)

GRADE	AUTHORIZATIONS
Colonel	5 %
Lt. Colonel	10 %
Major	20 %
Captain	44 %
Lieutenant	21 %

Table 2-1 Grade Authorizations

Historically, there has been a shortage of 20XX field grade officers. This shortage has lessened recently because of the maturation of some very large year groups which were assessed during the development of USSPACECOM and the Consolidated Space Operations Center. The following tables show the various levels of assignment for 20XX authorizations and a breakout of the different specialties.

LEVEL	AUTHORIZATIONS
Wing/Base/Sqd	26 %
MAJCOM Staff	9 %
Joint/Departmental	37 %
Division/Numbered AF	1 %
Other	25 %

Table 2-2 Distribution by Organizational Level

AFSC	AUTHORIZATIONS
2016	26 %
2025	9 %
2035	37 %
2045	1 %
2055	25 %

Table 2-3 Distribution by Specialty

A significant factor in Table 2-2 is the high percentage of MAJCOM and Joint/Departmental requirements. These positions require experienced space operators in order to acquire, develop, and manage current and future space systems. Thus, retention of significant numbers of 20XX company grade officers is critical to develop a "middle management" experience base for staff and Joint/Departmental activities.

LOCATION	PERCENTAGE
CONUS	93
Overseas	7

Table 2-4 CONUS vs. Overseas Distribution

STATE	PERCENTAGE
Colorado	60
California	15
New Mexico	6
Texas	4
Nebraska	4
Ohio	2
Florida	2
Other	6

Table 2-5 Authorizations by State

ACCESSION/CROSSFLOW PROCESS

Officers are selected for the space operations specialty via two methods--the accession process and crossflow resulting from the Undergraduate Space Training Selection Board. The accession process is the assignment of new second lieutenants graduating from ROTC, USAFA, OTS, etc. These officers are selected for space operations based on mission manpower requirements (how many) and the specific education and training requirements (generally technical) for the 20XX AFSCs. Another important

source of accessions is the acquisition of qualified Undergraduate Flying Training (UFT) eliminees. Officers selected have generally been eliminated only for medical reasons (motion sickness, manifestation of apprehension) and serve a an excellent unprogrammed source of manpower.

Officers already in the Air Force may apply for transfer to space operations via the Undergraduate Space Training Selection Board. This board is composed of senior space operations and personnel officers and held at the HQ AFMPC. The selection process is very competitive and analogous to that used for undergraduate pilot training. The board meets twice a year selecting about 30 officers on each occasion. (5:11) Most of the officers selected come from engineering, scientific, or acquisition career areas.

TRAINING

During the birth and evolution of AFSPACECOM and the space operations specialty, training programs were routinely non-standardized and depended heavily on on-the-job training (OJT). While the Department of Defense has long used OJT for upgrade training, the lack of standardization inherent in OJT produced serious training shortfalls when applied to sensitive space systems. These deficiencies, added to the risk of having students training with on-line equipment used to support critical national space and missile warning systems, characterized space operations training as inferior and frustrating for the young officer. (6:1)

To remedy this problem, in November 1985 HQ AFSPACECOM and Hq Air Training Command (ATC) developed the Space Operations Training Concept. Under this concept, ATC developed the Undergraduate Space Training Program to provide a broad base of space knowledge to all officers entering the space operations specialty. Undergraduate Space Training is currently 69 academic days and teaches principles of physics, space environment, orbital mechanics, space program overview, spaceflight fundamentals and operations, information management systems, surveillance, detection, and warning networks, foreign systems, and future systems. There is also limited hands-on training for generic space operator skills.

AFSPACECOM's role in the space operations training concept is to provide specific crew positional training through the 1013th Combat Crew Training Squadron (CCTS) located at Peterson AFB, Colorado. Following UST graduation or when training into a new space system, space operators train at the CCTS using academics and state-of-the-art simulators. The CCTS currently trains over 1,200 crew members a year--this will increase to nearly 2,000 by 1992.

CURRENT INFRASTRUCTURE

A reasonably effective force management infrastructure is in place to acquire, train, and manage current space operations personnel. However, the existing infrastructure focuses entirely on the active force. There are virtually no reserve or Individual Mobilization Augmentee (IMA) positions to support

space operations in a crisis or rapid mobilization scenario. In addition, it is not clear whether enough human resources will be available to support the expanding role of space (and related Blue Ribbon Panel strategies) in the future. To address this issue, we will next examine projected requirements and possibilities for future growth.

Chapter Three

CURRENT AND PROJECTED REQUIREMENTS

As previously discussed, the space operations career field has grown dramatically over the last eight years--more than tripling in size. However, accurately predicting future growth is a difficult exercise because of expected dramatic changes in the Department of Defense and Air Force budget. Influencing this process is Gramm-Rudman legislation to reduce the federal deficit, the evolution of our defense posture because of arms control, and the recent metamorphosis within the Soviet Union and Warsaw Pact. For purposes of this study (and supporting computer analysis conducted by AFMPC), the following assumptions were made concerning space operations growth:

a) DoD budget cuts and arms reductions will continue to focus on terrestrial and air-breathing systems. By all indications, the Bush administration remains a strong supporter of the space program.

b) The <u>rate</u> of growth for new space systems will be reduced--but real growth in the space arena will continue.

c) To quantify projections for this study, all firm (funded) requirements and tentative (currently unfunded), but specific, requirements were considered. Projected requirements were provided by HQ AFSPACECOM/DOT/MPM and HQ AFMPC/DPMRO04. For a "best estimate" outyear growth (93-99), I have assumed a growth rate of 50 percent of the <u>average</u> rate of growth for 1981-1988, which were extraordinarily high growth years due to the

development of many new systems and a new command (USSPACECOM).

d) The 20XX specialty will continue to satisfy manpower requirements via accessions, selected UFT eliminees, and crossflow officers from the UST Selection Board. However, I believe it's fair to assume that the numbers from both categories will decrease (for example, 20XX accessions have dropped by 60 percent since 1987). This will be especially true of the crossflow process because as other Air Force specialties experience reduced manning (for fiscal reasons) they will be unable to release engineers, acquisition officers, etc. for retraining into space operations.

e) As suggested by HQ AFMPC, the attrition rate (separations, retirements) for space operations officers is projected at 7.5 percent. AFMPC believes this to be a realistic rate as the career area is increasingly developing demographic and attrition characteristics similar to the scientific/ engineering specialties (vice operations specialties).

The focus of space operations growth should reflect the following programs:

MILSTAR: Military Strategic-Tactical and Relay Satellite System. This is DoD's most ambitious satellite communications program and supporting ground network. MILSTAR is an all-service, jam-resistant, survivable satellite system.

Deep Space Tracking System: This AFSPACECOM initiative includes development of a new tracking station at Feltwell, England.

Blue Ribbon Panel Initiatives: This represents initiatives resulting from the USAF Blue Ribbon Panel on Space. Under these initiatives, the Space Surveillance Center and certain other Cheyenne Mountain functions would be transferred from USSPACECOM to AFSPACECOM. This would require additional Air Force 20XX billets.

Navstar Global Positioning System: This navigation network will eventually consist of 24 satellites in medium altitude, inclined orbits that provide continuous satellite coverage. Navstar satellites will be able to "fix" the position of a soldier, aircraft, or ship within 16 meters with the aid of atomic clocks which will remain accurate for 36,000 years.

New Space Wing: This entails the establishment of an additional (fourth) AFSPACECOM operational wing to manage and control either deep space satellite and surveillance assets or space launch operations.

Growth of 20XX positions at "Warfighting" commands: Per Blue Ribbon Panel direction, warfighting CINCS and commanders will add space operations expertise to their staffs.

Space Operations Training: As new missions develop, additional training programs (more instructors) will be established.

Strategic Defense Initiative: This huge effort is still a question mark in terms of timing for an operational capability. However, when it is deployed it is certainly a reasonable

assumption that Air Force space operators will command and operate the varied systems--thus the possibility of <u>immense</u> future growth. Note that this growth will require <u>experienced</u> space operators. Thus, according to AFMPC/ROO4, the personnel acquisition process should start 18 months <u>prior</u> to any limited operational capability.

PROGRAM	FY91	FY92	FY93-99
Vacancies	85	TBD	TBD
Attrition	100-130	100-130	130-150
MILSTAR	39	26	
Deep Space OL	4	5	
Deep Space Wing	--	20	
UFO	30	4	
Blue Ribbon Panel	--	75	
Outyear Estimates	--	--	120 Per Year
TOTAL	258-288	230-260	250-270 Per Yr.

Table 3-1 Outyear Projections

Based on AFSPACECOM/AFMPC estimates and existing POM submissions, growth of the space operations mission and requisite manpower requirements will continue, even in the wake of conventional force reductions and fiscal constraints. The problem, therefore, is will the specialized manpower resources be available to meet this growth? This will be addressed in the next chapter.

Chapter Four

FACTORS AFFECTING SPACE OPERATIONS MANPOWER

Basic to analyzing manpower availability for the space operations mission is a clear understanding of demographic changes forecast for the U.S. population. There have been two major demographics phenomena that have shaped the population for the last 25 years and whose implications will drive the demographics of the future: the baby boom and the resultant baby bust. The post-World War II baby boom was initiated in 1946 by an approximate 20 percent increase in the number of live births compared to that recorded in 1945. A steady increase in the annual number of births continued to the early 1960's. This population group inserted a permanent but moving bulge into America's age structure, flooding the nation's school systems in the 1950's and 1960's, and the higher education system in the 1960's and 1970's. (7:19) Products of the "baby boom" continue to populate the majority of age groups in the current U.S. military and space operations mission.

Toward the end of the 1960's, the U.S. population entered a period of transition to zero growth (baby bust). This was due basically to changes in American fertility. (8:3) For example, in 1967 the American female expected to achieve 3.1 births during her childbearing years. This expectation declined to 2.7 in 1971, then sank below replacement level (2.0) and remained there for over a decade. (9:256)

Implicit to this study is the fact that due to the baby bust the future population (age 18-24) eligible for college and/or the military service will decline dramatically. Census Bureau projections indicate that the number of 18-24 year olds will decline from 30.4 million in 1982 (when AFSPACECOM was establisned) to 23.3 million in 1996 (early SDI capability?), a 23.4 percent decrease. (10:36) Because the peak of the baby bust generation is in high school between 1980 and 1990, enrollment in high schools in 1990 should be 20 percent lower than 1980. Thus, the leading edge of the baby bust entered the college years during the 1980-1990 decade and will cause substantial declines in enrollment through the year 2000. (9:402) Furthermore, from a purely military aspect, to maintain the present force level of the Armed Services (which will probably be reduced), one of every 4.6 eighteen-year-old males will have to be recruited. (11:3)

In addition to changes in the overall numbers, census experts also predict qualitative changes in the (decreased) student mix that could affect science, engineering, and (as a result) space operations manpower. Specifically, the percentage of minorities in the 18 to 24 year-old category will increase from 20 to 27 percent by 1998, so an increased participation of Blacks, Hispanics, Asian Americans, and other minorities in higher education can be expected to continue. These groups, with the exception of Asian Americans, have, however, participated less actively in science and engineering education than the

majority population. Furthermore, the numbers of women and part-time students are expected to increase twice as rapidly. These groups also participate in science and engineering at lower rates than their white male, full-time student counterparts. (10:20)

As has been illustrated, the population available to support space operations manpower requirements is declining both quantitatively (less people in general) and qualitatively (less technically educated people). Exacerbating this already difficult situation are civilian job requirements that are growing faster than the labor force and the direct competition between the Air Force (or DoD) and industry for our nation's most precious resource--people. With these disturbing trends as a foundation, we'll now examine the current space operations resource and describe the current and predicted retention situation.

SPACE OPERATIONS OFFICER RETENTION

The most accurate measurement of retention for space operations officers is the cumulative continuation rate (CCR). HQ AFMPC defines CCR as the percent of officers entering a given year group who would complete a designated period of service if current retention patterns remained the same, computed on a 12-month basis. For example, a 50 percent rate for space operations officers in the 4-11 year group means that for every 100 20XX officers entering the fourth year of commissioned service, 50 would complete the eleventh year if current rates persisted. The 4-11 CCR is considered the best reflection of

retention because, during this period, officers have the most options in terms of career decisions, i.e., the first four years are covered by an officer's initial service commitment and, after the eleventh year, officers are either promoted to major (and generally stay to retirement) or separated due to failure in being promoted.

A review of retention data indicates that 20XX retention rates are stabilizing near engineer retention levels, which have historically been low (more lucrative civilian opportunities) and the cause for concern. (12,13) In addition, AFSPACECOM non-rated operations officer (20XX) retention levels are even lower--especially when compared to overall Air Force CCRs for non-rated operations (this would include missile operations-18XX, weapons controller-17XX, and operations management-19XX).

AFSPACECOM 20XX	50.5
Total 20XX	56
Engineer	55
Total AF non-rated Ops	69

Table 4-1
Average 4-11 Year Group CCR 1983-1989

A possible interpretation of AFSPACECOM's lower retention level than the total Air Force space operations population is that the majority of AFSPACECOM 20XX positions are operations crew (vice staff or R & D). When young officers with a scientific or engineering background are assigned to these 20XX positions, many are dissatisfied because of the minimal applicability of their academic education and lack of professional/intellectual challenge.

Supporting this interpretation is the Occupation Survey Report of the Space Operations Utilization Field which was completed by the USAF Occupational Measurement Center, Randolph AFB, TX in July 1987. The survey was requested by HQ AFSPACECOM/ DCS Operations to validate career field organization and update Undergraduate Space Training. (14:1) In response to the occupational survey question, "Do you need a technical degree to perform your job?", 253 respondents answered "Yes" while 427 answered "No". A comparison of tasks performed by personnel who "need" a technical degree (per AFSC requirements) with the tasks performed by personnel who do not "showed no major differences." (14:43) Based on these findings, the Occupational Survey Report stated that:

> The present requirements for ...specific technical degrees listed in AFR 36-1 need review. Incumbents indicate many jobs do not require these prerequisites. The imposition of these prerequisites may unnecessarily prevent otherwise qualified personnel from entering the Space Office Utilization Field. (14:44)

In addition to being unnecessary, the technical degree requirement has also led to some officer dissatisfaction. In response to a survey conducted by the Peterson Complex Company Grade Officer Council concerning goals, missions, and careers, the following responses were offered by AFSPACECOM junior officers. (15:5-10)

Question: Are you sufficiently challenged in your present job?

Answers:

- "Engineer--never get to engineer anything"

- "Haven't used my education"

- "Hardly need a Masters in Engineering"

- "Trained as an engineer--but do not have an engineering job"

Question: Please list issues that you feel we need to further address or work.

Answers:

- "Engineer or contract monitor?"

- "Use me to do engineering"

- "Why have a physics degree to babysit satellites?"

Compounding this apparent dissatisfaction are assignment considerations peculiar to the space operations specialty. With a CONUS to overseas ratio of nearly 9:1, an Air Force space operator is generally assigned to one remote tour during a twenty year career. When compared to other DoD operational duties, that is a very reasonable ratio. However, over sixty percent of all 20XX assignments are in Colorado (primarily Colorado Springs). Thus, space operations officers enjoy <u>much</u> more geographical stability than most of their Air Force counterparts. Unfortunately, this too can lead to retention problems as these officers (and their families) get firmly established in the Colorado Springs area and often look very hard (especially if dissatisfied) at civilian employment when offered the opportunity to "go remote."

PREDICTIVE ANALYSIS

As previously illustrated, AFMPC data indicates that the retention rate for space operations officers has declined. 20XX retention now mirrors that of the engineer career area, rather than operators. This lower retention, when factored into a decreasing (quality and quality) accession population and influenced by subjective concerns (lack of challenge, job opportunities) could lead to critical manpower shortfalls.

The 20XX AFSC was consistently manned at or above 100 percent through 1987 (Appendix B). However, due to decreased accessions and retention, current manning is near 90 percent with further decreases projected (Appendix C). Using the Air Force Required Accession and Distribution System (AFRADS) computer program, growth assumptions detailed in Chapter Three of this paper, and historical trends provided by the Space Operations Assignments Team, AFMPC/DPMYAF "aged" the 20XX career field. The goal was to produce a quantitative "snapshot" of the space force into 1999.

As Table 4-1 indicates, the FY90 20XX force inventory generally meets the force objective line for each year of commissioned service (note: the objective line is based on operational and grade structure requirements). The only indication of future problems is the small inventory for year groups 1-3.

FY90

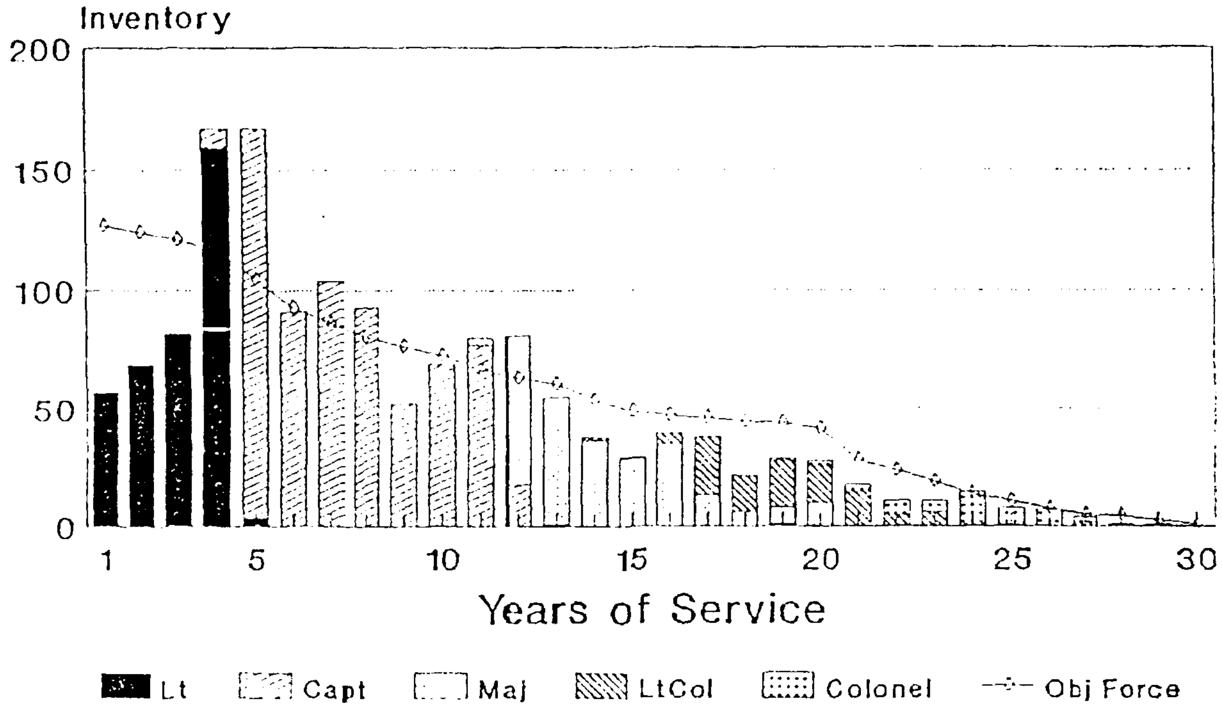

Table 4-1

Tables 4-2 and 4-3 which "predict" space operations manpower for 1994-1999 indicate future shortages. Insufficient company grade manpower is prevalent in the 1994 analysis (Year/groups 1-7). By 1999, reduced manning is consistent through the twelfth year of service. In other words, the career field would not be sustainable and would not be able to satisfy operational requirements.

End FY94

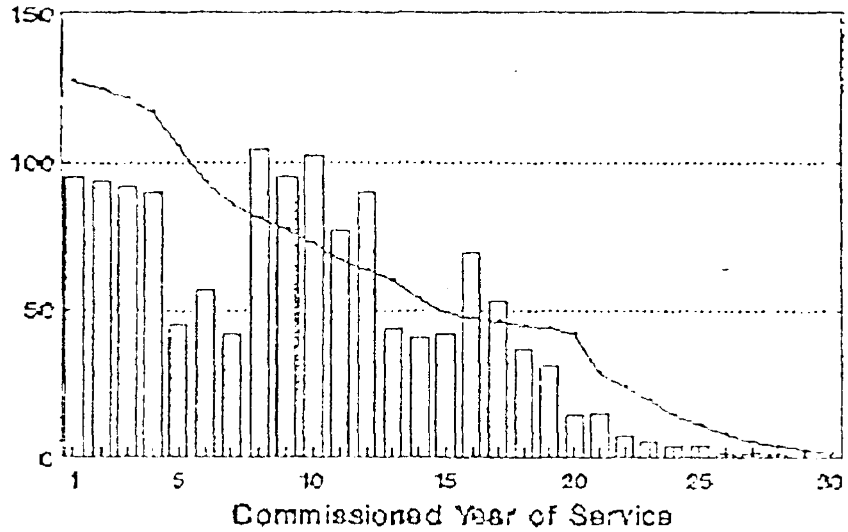

Table 4-2

End FY99

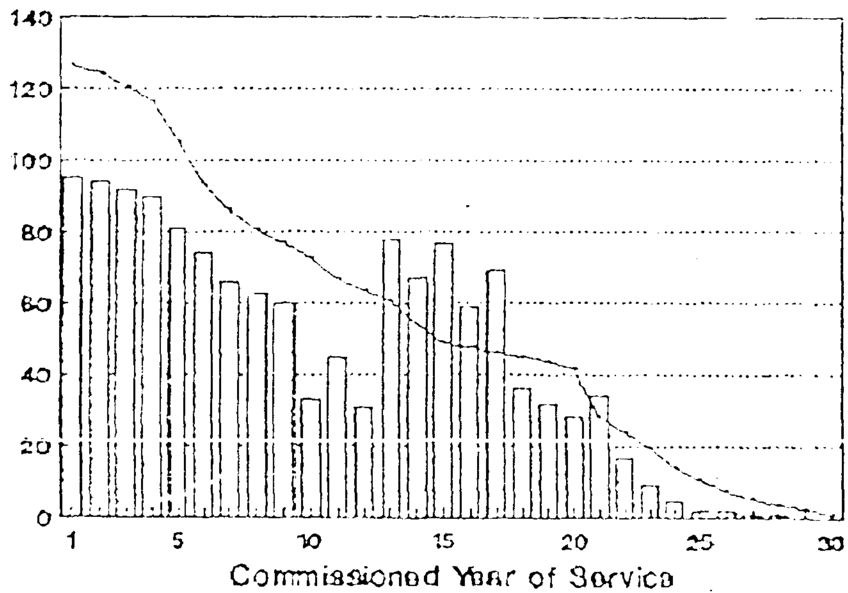

Table 4-3

The preceding analysis does not pretend to provide an infallible "crystal ball" view of the future. Geopolitical events, social and economic trends, and new military priorities could easily affect the growth and direction of space operations. However, based on reasonable assumptions, hard data, and historical trends, current analysis indicates that space operations force management will be a challenge in the coming years.

Chapter Five

FINDINGS--IS THERE A PROBLEM?

The previous chapter detailed concerns in relation to space operations force management. In addition, background information on the demographics, duties, and training for space operations officers has been provided to give the reader at least some understanding of the complexity and growing importance of this Air Force specialty. This chapter summarizes findings which illustrate serious obstacles in meeting outyear space operations manpower and force management requirements and difficulties in satisfying fundamental strategies proposed by the Air Force Blue Ribbon Panel on Space.

FINDING: U.S. POPULATION AND EDUCATION PROJECTIONS INDICATE A MUCH SMALLER ACCESSION POOL FOR SPACE OPERATIONS.

Basically, because of the "baby bust" and other demographic changes, 1990 to 2000 projections indicate a decrease of almost 22 percent in the available general manpower pool. In terms of space operations, this fundamental decline is exacerbated by a) an even larger decline in science and engineering college graduates, b) predictions that civilian job requirements will grow faster than the available labor force--thus, extreme competition for personnel resources, and c) increased requirements within the Air Force for space operations expertise. As a baseline finding--outyear projections show less resources (quantity and quality) for increased space operations requirements.

FINDING: RETENTION RATES FOR SPACE OPERATIONS OFFICER HAVE DECLINED.

As previously illustrated, retention rates for space operations officers is stabilizing near engineer (vice operations) retention levels, which have been historically low and the cause for HQ USAF concern. Retention problems are exacerbated by job dissatisfaction, more lucrative civilian opportunities, unattractive remote tour requirements, and limited applicability of a technical education to many space operations tasks.

FINDING: TECHNICAL DEGREES ARE NOT REQUIRED FOR MOST SPACE OPERATIONS OFFICER POSITIONS. THE TECHNICAL DEGREE REQUIREMENT IS NEGATIVELY AFFECTING RETENTION.

The Occupational Survey Report of the Space Operations Utilization Field which was accomplished by the USAF Occupational Measurement Center determined that current technical degree requirements need review. The report indicated that many jobs did not require the technical prerequisites and qualified personnel were unnecessarily prevented from entering the career field. In addition, feedback solicited from AFSPACECOM junior officers indicates dissatisfaction because of over qualification and lack of technical challenge.

FINDING: MANY OF THE STRATEGIES RECOMMENDED BY THE BLUE RIBBON PANEL ON SPACE ARE AT RISK.

As described at the beginning of this paper, the Blue Ribbon Panel on Space identified a number of objectives in order to

"posture the Air Force to execute its proper role in space." (1:2) Key to these objectives are strategies designed to expand our capabilities for space control (ASAT, battle management), space support (launch, command and control), force enhancement (on-orbit assets to assist terrestrial forces), and force application (SDI). However, the assumption behind each of these strategies is that enough space operations manpower will be trained and available to accomplish mission requirements. This growing space operations manpower pool is also required to support the panel's key strategy for integrating space throughout the Air Force via "expanding the flow of personnel within the space community and expanding the flow of expertise throughout the Air Force." (1:4) Of particular note is the plan to place operationally experienced AFSPACECOM officers into the Air Force Systems Command research, development, and acquisition process--this presumes that there will be enough operationally experienced officers to fill operational requirements (and then some).

Based on the analysis presented in this paper, it seems evident that these strategies are at risk. With a decreased overall target population, decreased production of technical college graduates, increased competition from civilian industry, implications of decreased retention among space operators, and predictions of reduced manning--the prospects of expanding the

flow of space operations expertise seem slim. In fact, it appears that meeting basic manpower requirements will be a major problem.

Chapter Six

RECOMMENDATIONS AND CONCLUSIONS

As the findings detailed in Chapter Five illustrate, there are numerous factors affecting the future success of space operations force management. This chapter suggests recommendations which may alleviate some of the problems previously explained.

RECOMMENDATION: REVISE AFR 36-1; ELIMINATE THE MATH REQUIREMENT FOR AFSC 2016 (STAFF OFFICER), 2035 (SPACE OPERATIONS OFFICER) AND 2055 (SATELLITE OPERATIONS OFFICER).

Occupational survey results, specific space operations officer comments, and common sense concerning space operator tasks all dictate that a technical or engineering degree is not required for most space operations specialties. This is especially true of AFSCs 2016, 2035, and 2055. The math requirement (six hours, to include three hours of calculus) listed in AFR 36-1 for these AFSCs should be revised from "mandatory" to "desirable." Elimination of this requirement will greatly broaden the accession pool for space operations and eliminate the current situation where engineers and scientific students are incorrectly (and unhappily) assessed into an operational career field.

RECOMMENDATION: REVISE THE UNDERGRADUATE SPACE TRAINING (UST) CURRICULUM--REDUCE MATH, PHYSICS REVIEW AND INCREASE "HANDS-ON" SPACE OPERATIONS TASKS.

In a parallel action to revising AFR 36-1, UST should be revised to reflect a more task oriented curriculum, focused on generic space operations crew procedures accomplished in a simulator environment. This task oriented curriculum could replace much of the math/physics review currently offered. Those officers who actually needed more technical training (orbital analysts, manned space flight), could receive it during specific specialty training at the 1013th Combat Crew Training Squadron. By making training more realistic and more applicable to actual duties, much initial job dissatisfaction could be reduced.

RECOMMENDATION: SPACE OPERATIONS MANPOWER REQUIREMENTS SHOULD BE IDENTIFIED EARLY.

HQ USAF, AFMPC, and HQ AFSPACECOM should coordinate the early identification of new space operations manpower requirements. According to HQ AFMPC/ROO4, at least 18 months "lead time" is needed to acquire new accessions or crossflows, coordinate assignment actions, and complete initial training. Thus, early identification of requirements is imperative to effective force management in a future of limited resources. A likely forum for requirements coordination is the Space Operations Career Management Group (SOCMG) which is chaired by HQ USAF/XOF and AFMPC/ROO4 and held at least yearly.

RECOMMENDATION: THE NUMBER OF 20XX ACCESSIONS SHOULD BE STABILIZED. A PRODUCTION QUOTA, SIMILAR TO RATED FORCE MANAGEMENT, SHOULD BE ESTABLISHED.

Acquisition of 20XX accessions is currently an erratic process which is tied to a "Trained Personnel Requirement" (TPR) established by AFSPACECOM, HQ ATC, and AFMPC. Because this TPR is conceived each year, it is tied to the whims of the DoD budget, political influence, and mission priorities. As a result, it can vary from over 250 to 45. If not managed properly, this can lead to widely varying year group sizes and outyear manpower shortages (as indicated in Chapter Four). A consistent production quota of UST graduates should be established by the space community. This would necessitate establishing an "average" replacement/growth requirement similar to the methodology currently used in rated officer force management. Once established, the production quota would stabilize training and year group size and also provide a consistent goal for outyear recruiting.

RECOMMENDATION: THE UST SELECTION BOARD AND ACQUISITION PROCESS OF UNDERGRADUATE FLIGHT TRAINING ELIMINEES SHOULD BE MAINTAINED TO MEET UNEXPECTED GROWTH.

In concert with the production quota system outlined above, the UST Selection Board process should be maintained as a flexibility mechanism to provide crossflow officers in support of unprogrammed space operations growth. Likewise, the strategy of acquiring UFT eliminees should be maintained for the same reason. Basically, these two force management tools can be "turned on/off" to accommodate large or unexpected manpower growth (SDI, etc.).

RECOMMENDATION: AIR FORCE RESERVE AND INDIVIDUAL MOBILIZATION AUGMENTEE POSITIONS SHOULD BE ESTABLISHED FOR SPACE OPERATIONS.

Even if effective force management actions are implemented to minimize space operations manpower shortfalls and maximize recruiting, retention, and year group stability--a certain amount of space expertise will leave the Air Force for civilian employment. To utilize this expertise in a wartime surge or accelerated deployment of a national asset, such as SDI, Air Force reserve and IMA positions should be established within AFSPACECOM and USSPACECOM. As previously mentioned, currently only a handful of space related reserve positions exist. Development of a robust mobilization capability would provide a readily accessible space operations experience base to meet the many challenges to tomorrows force.

CONCLUSION

The contribution of space systems and space operations to our national security strategy is steadily increasing--even during current conventional force reductions and budget cuts. The parallels between the ascent of air power in the 1930s-40s and space power in the 1980s-90s are many. Doctrine, roles, missions, technology, and force structure are all being debated as space operations matures as a warfighting asset--much like the evolution of air operations. Likewise, both air power and space power require experienced operators to accomplish their critical missions. The retention of aviators has been, historically, a difficult problem, with "solutions" generally

provided via the reactive (vice proactive) mode. An analogous problem is developing for space operations. With a decreased overall target population, increased competition from civilian industry, decreased retention and low manning levels--the prospects for developing and expanding USAF space operations expertise are not encouraging. Only early recognition of this problem and aggressive implementation of innovative solutions will ease the impact. To look the other way will jeopardize the space operations missions of today and our national security strategies for tomorrow.

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APPENDIX A

Air Force Blue Ribbon Panel on Space

- Strategies to support defining/implementing the Air Force role in space:

  -- Publish executive guidance

  -- Expand capabilities for space control operations

  -- Expand capabilities for space support operations

  -- Expand capabilities for force enhancement operations

  -- Develop capabilities for force application operations

  -- Normalize inter-Service relations for space

  -- Establish normal component role for AFSPACECOM

- Strategies to support integrating space throughout the Air Force

  -- Expand the flow of personnel within the space community

  -- Expand the flow of space expertise throughout the Air Force

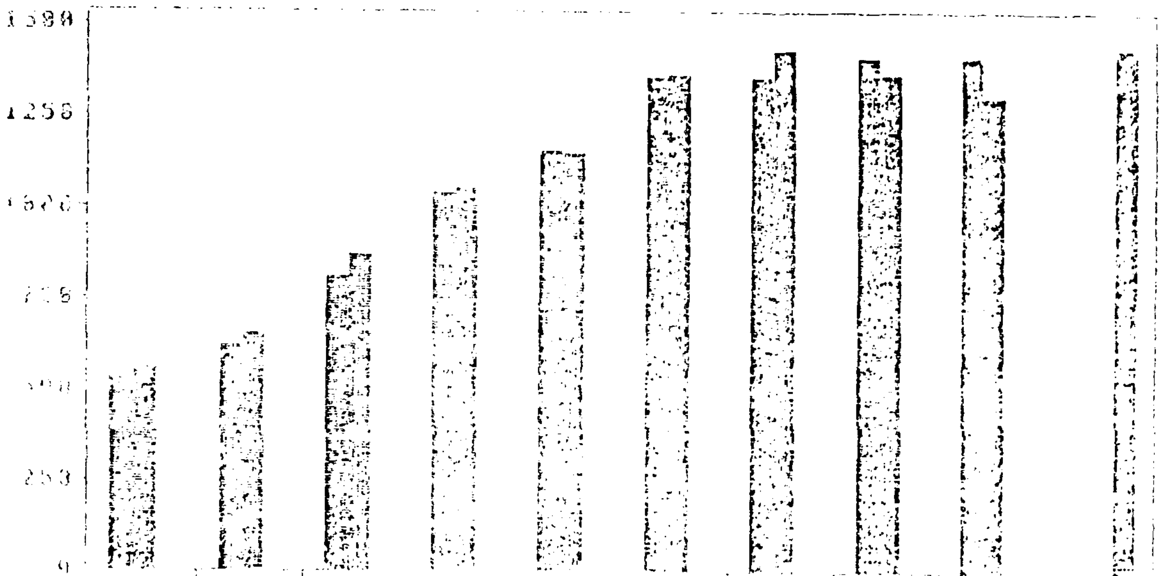
  -- Increase the application of space expertise in the Air Force's PPBS process

  -- Normalize PEM responsibilities

  -- Normalize MAJCOM relations

APPENDIX B

20XX MANNING HISTORY/GROWTH



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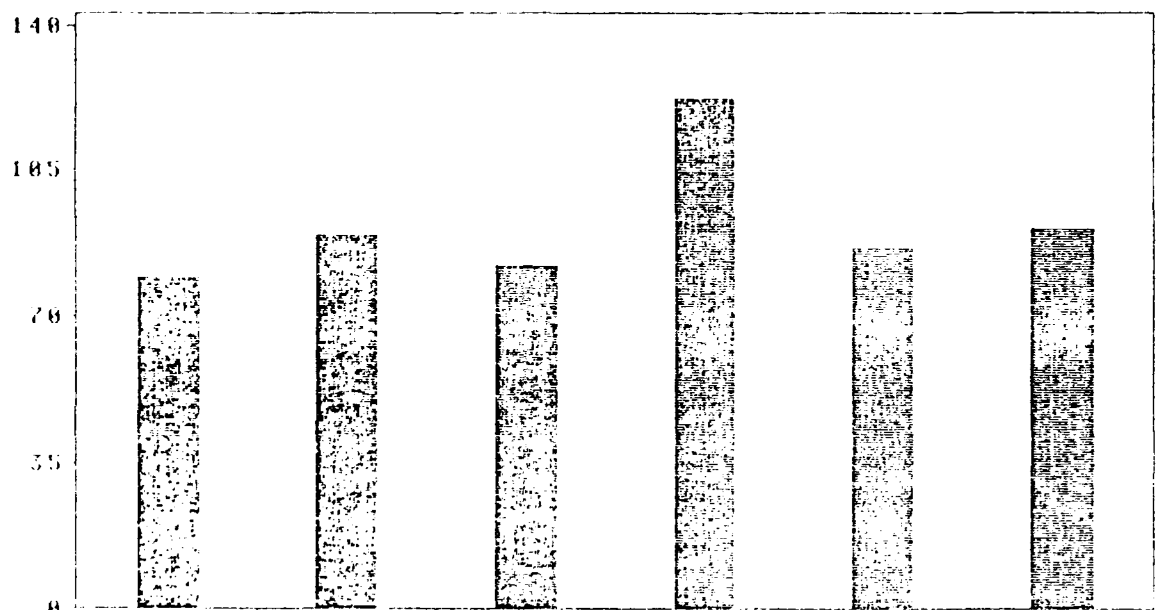
PROJECTED										1439

APPENDIX C

SPACE OPERATIONS MANNING



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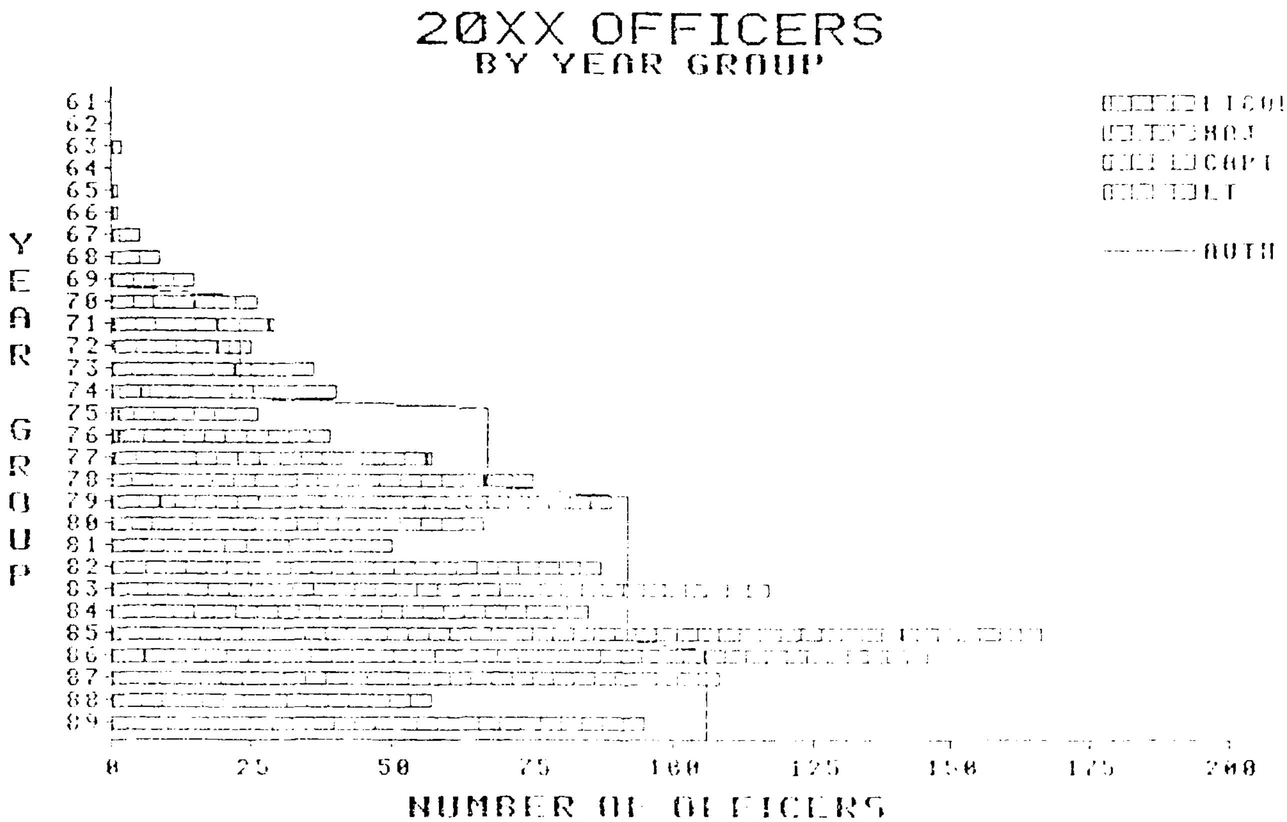
20ØXX OFFICERS
BY YEAR GROUP
LTCOL
MAJ
CAPT
1LT
AUTH
YEAR GROUP
61
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NUMBER OF OFFICERS